
LAKE OKEECHOBEE WATERSHED USER INTERFACE FOR ANALYZING PHOSPHORUS LOADING

Mandate:

Lake Okeechobee Watershed Protection Program (LOWPP)

Background:

The Lake Okeechobee Protection Plan area includes six regions with 61 drainage basins that contribute runoff discharge to Lake Okeechobee. Phosphorus in the discharge has been identified as the primary cause of eutrophication of the lake. Nutrient levels in the runoff are directly related to land use and land use practices. In 2000, the Lake Okeechobee Protection Act (Section 373.4595, Florida Statutes) was passed by the Legislature to establish a restoration and protection program of the lake. In 2001, the Florida Department of Environmental Protection (FDEP) established a Total Maximum Daily Load (TMDL) for total phosphorus entering Lake Okeechobee (FDEP, 2001). The TMDL is 140 metric tons per year, including 35 metric tons of phosphorus from rainfall directly falling onto the lake. This TMDL is a long-term (five-year) rolling average of 140 metric tons to be attained by 2015. In January 2004, the South Florida Water Management District (SFWMD), in cooperation with FDEP and Florida Department of Agriculture and Consumer Services (FDACS), developed the Lake Okeechobee Protection Plan as required by the Act. The Plan defined a number of projects and activities to reduce phosphorus in order to meet the phosphorus TMDL by 2015. A phosphorus budget study was one of the research projects included to support the Plan. A materials balance approach to phosphorus management provides information about the total amount of phosphorus that enters and exits the watershed on an annual basis. Accounting for imports and exports of phosphorus containing materials provides a baseline for field research and a more detailed understanding of how changes in management practices affect phosphorus flow. Materials balance is a particularly useful tool when linked to a Geographical Information System (GIS) for spatial representation and analysis.

Project Overview:

Phosphorus cycling in the environment is a function of both natural processes (e.g. plant uptake, weathering of minerals, senescence, and mineralization of organic matter) and anthropogenic factors (e.g. agriculture, fertilization, mining, and human consumption). The effects of these processes on water quality are determined by land use patterns and phosphorus discharge associated with each land use.

The overall objective of this project was to develop an ArcGISTM based graphical user interface, P-Budget, for analyzing phosphorus import/export and loads within the entire LOWPP area (Figure 1). The interface was to include tools for creating and assessing Phosphorus Control

Plans (PCPs), displaying land use and net phosphorus import as maps side-by-side, selecting specific geographic areas for assessments, and generating reports including tables, charts and figures to illustrate the results. A hydrological and water quality model known as Watershed Assessment Model (WAM) also was dynamically linked to estimate phosphorus load in surface water discharge.



Figure 1: Lake Okeechobee Watershed Protection Program (LOWPP) Area